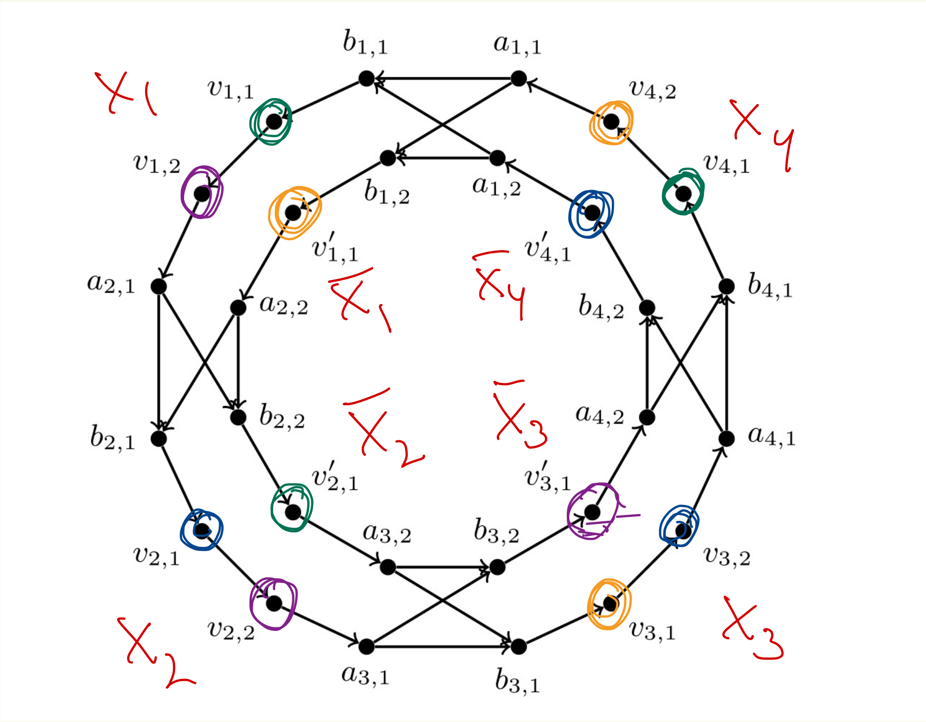
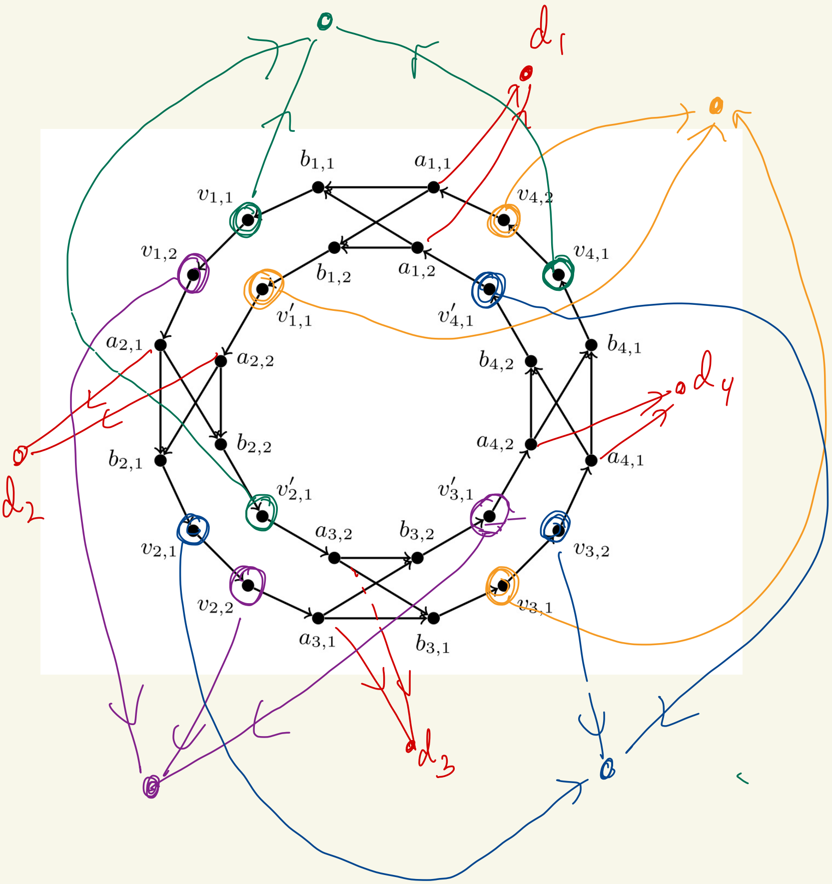


$(\bar{x}_1 \vee x_3 \vee x_4)$

$(x_2 \vee x_3 \vee \bar{x}_4)$

(strong, connected)-$[k_1, k_2]$-partition $k_1 \geq 2$, $k_2 \geq 1$

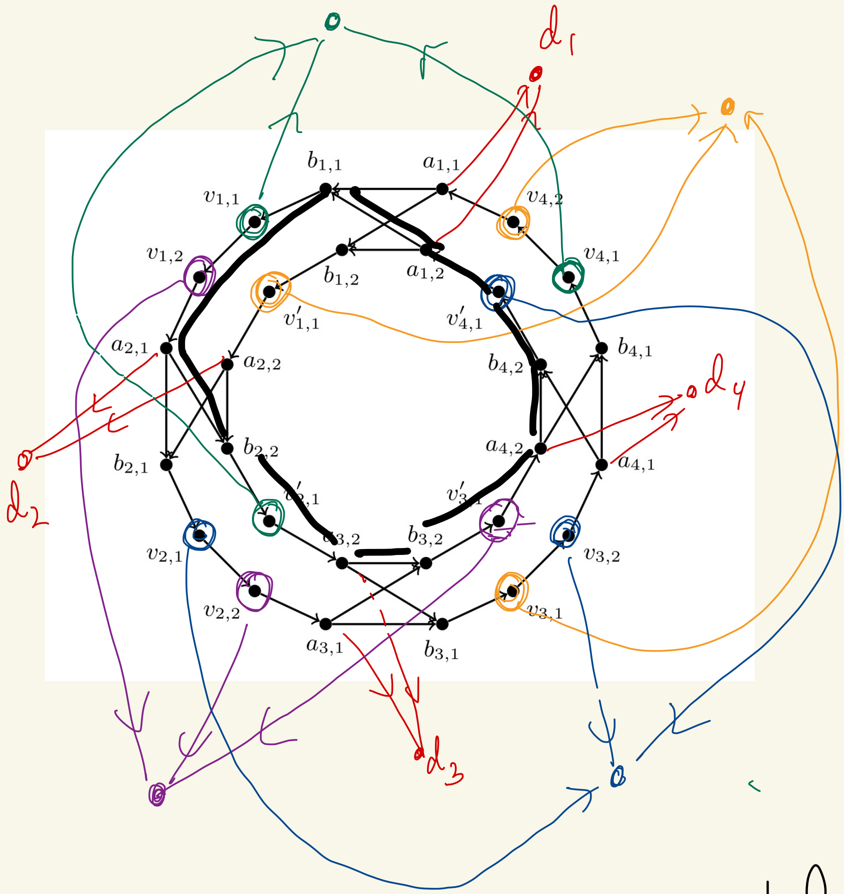


D_f

D_f has a (strong, connected)-$[k_1, k_2]$-partition with $k_1 \geq 2$ and $k_2 \geq 1$

$\Updownarrow$

f is satisfiable

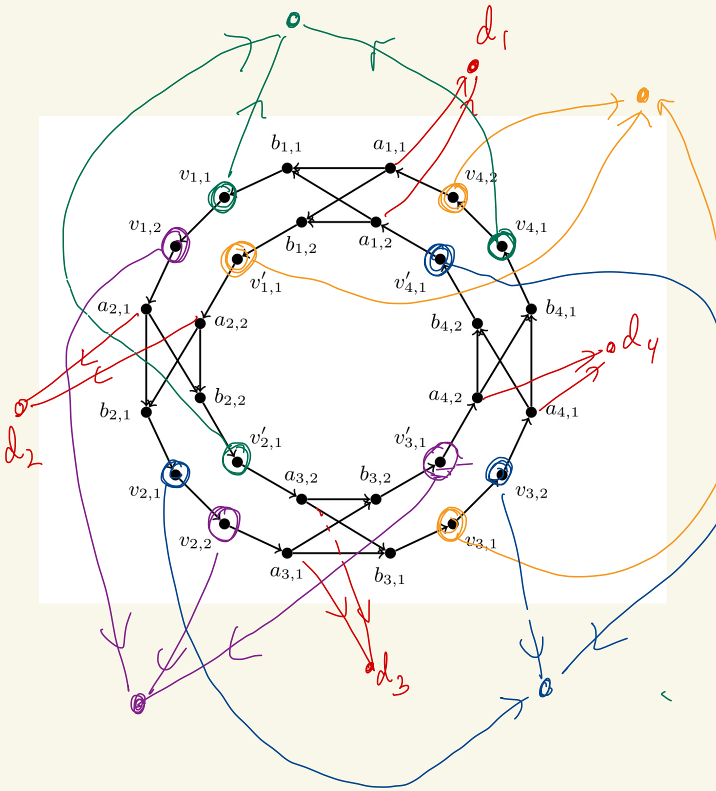


$\Longleftrightarrow V_1 \quad V_2 =$ rest connected

$\Updownarrow$

f is satisfiable

$(\delta^0 \geq 1, \delta^- \geq 1)$-$[k_1,k_2]$-partition $k_1,k_2 \geq 1$



all vertices out-side the ring must belongs to V_2

$\Downarrow$ either $a_{i,1}$ or $a_{i,2}$ is in V_2 and at least one vertex of each W_j is in V_2 (e.g $v'_{1,1}, v_{3,1}, v_{4,2}$)

- precisely one of $a_{i,1}, a_{i,2}$ is in V_2 (otherwise all vertices are in V_2)
- if $a_{4,1} \in V_2$ then $v_{3,2}, v_{3,1}, b_{3,1}$ in V_2 (similarly for all other $a_{j,1}, a_{j,2}$)

$\Rightarrow$ V_1 induces a cycle that avoids at least one vertex of each W_j $\Rightarrow$ f satisfiable